PERITONEAL ADHESIONS.*

THEIR SYMPTOMATOLOGY, PATHOLOGY AND PREVENTION.

By E. E. KELLY, M. D., S. F.

ASEPSIS has been the inspiration of much bad surgery. It has made safe, as far as the life of the individual is concerned, many operations which were formerly attended with a very high mortality. It has stimulated the performance of many operations that were formerly considered unjustifiable. A low mortality has become synonymous with good surgery. Many a victim of the scalpel is suffering more from the results of his operation than he did from his disease, while his case is used to swell the statistics of "successful operations" of the enterprising aspirant for surgical honors. It is not a certain indication of a good surgeon that the aspirant for such honors can open the abdomen one hundred times without a fatality. More surgical skill is required to determine when to advise operation and when to advise against it, than is embodied in the mechanics and anatomy necessary for its performance. The success of a surgical procedure should be measured by the net saving of human suffering and the restoration of the individual to his sphere of usefulness, rather than by the hair-breadth escape of the victim from the hands of the undertaker.

In no other part of the human anatomy can the reproach of bad surgery be seen so often as in the abdominal cavity. No more frequent source of chronic invalidism after "successful operations" can be found than that due to adhesions in the abdominal cavity. Many a mysterious and inexplicable disordered function of the abdominal organs, and much of the harassing and irremediable pain in the abdominal cavity is due to peritoneal adhesions. I would not imply that adhesions are largely due to bad surgery, though some undoubtedly are the result of careless and unskillful operations. Many cases are the result of accident and inflammation following infection.

We now recognize that "peritonitis saves life, while sepis kills. Peritonitis builds barriers against invading hosts, while absorption overwhelms the organism with infectious products." But, while we recognize this preventative process of nature, we also find that it leaves chronic invalidism behind. The peritoneum secretes and absorbs fluids, permits free movements of the viscera upon one another without friction, while at the same time anchoring the abdominal organs to their proper positions. The functional activity of the digestive organs depends largely upon the health of the peritoneum. It is also the bodyguard of the abdominal cavity, ready at a moment's notice to throw out exudates to protect wounded viscera or to summon an innumerable army of leukocytes to imprison, transport or destroy any invading infection. It erects barriers against an advancing foe and limits its field of action. To preserve intact, when possible, this most important membrane and to restore it, when operative assault is imperative, should be the constant effort of every conscientious operator.

Peritoneal adhesions result from injury or infection. Byron Robinson has proven by experiments upon rabbits that handling the intestines, or slight friction of the endothelium, such as that occasioned by sponging, is very often followed by adhesions. Harris has shown by experiments upon the lower animals that bacteria which are non-pathogenic where the endothelium has been undisturbed, become pathogenic after irritation of the peritoneum, even though no microscopic lesion is apparent. Senn by experiment learned that adhesions between serous surfaces occur very rapidly, in from six to twelve hours. These adhesions were found to be preceded by an exudate of plastic lymph which cements the serous surfaces. Between raw surfaces or a raw and serous surface the adhesions are Nature's reparative efforts and are firmer and usually more rapid than where the serous surfaces adhere.

Some investigators insist that all adhesions after surgical procedures are the result of infection; while others hold that mechanical and chemical irritants occasion them without infection. There can be no question but that bacteria cause leukocytosis and the exudation of the plastic lymph from which adhesions form. That adhesions may occur without infection is equally certain. Walthard, of Berne, has made elaborate experiments upon cats and rabbits of great value in determining the etiology of peritoneal adhesions. His experiments were performed with the greatest aseptic precautions possible. His first set of experiments was upon rabbits in which abdominal hysterectomy was performed, exposing the peritoneal surfaces of the utero-vesical pouch to the air, but avoiding contact with sponges, hands of the operator, or other foreign body. In every case, adhesions in the vesico-uteral pouch resulted. He then performed the same operation upon six rabbits, but turned the uterus out of the wound, protecting the peritoneal surfaces with hot pads wrung from hot normal salt solution. Post-mortem examination six days later showed that no adhesions had occurred and no exudate was thrown out. His next experiments were the exposure of omentum and fundus of the bladder to the air for twenty minutes by drawing the mouth of the abdomen through a small incision. Twelve days later adhesions were found in every case between omentum, fundus of the bladder and abdominal incision, but none between intestinal coils which had not been exposed to the air. Another set of cases with similar ex-

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posures was made, with the exception that the exposed viscera were protected by hot pads wrung from normal salt solution. No adhesions occurred. Exposures were then made of the viscera to filtered and disinfected air, with the result that adhesions formed in every case. He then used the same apparatus and subjected the exposed viscera to steam at a temperature of 38° C. and in every case adhesions were absent. Walthard concludes that exposure of the peritoneum to dry air is productive of adhesions, while steam and normal salt solution applied constantly to exposed surfaces prevent adhesions. These findings are in accord with the conclusions of Turck, who experimented upon the lower animals, investigating the susceptibility of the peritoneum. In his experiments he found that nonpathogenic germs became pathogenic upon peritoneum exposed to dry air, and that moist heat maintained the normal resistance of the membrane. Turck further found the impossibility of rendering the skin aseptic, but proved that no germs remained after complete cleansing which were pathogenic to the organism, unless shock, undue loss of blood, or exposure to dry air, had lowered the natural body resistance. Therefore, shock, loss of blood, exposure of the peritoneum to dry air, as well as bacterial infection, are etiological factors in the production of adhesions.

The symptoms of peritoneal adhesions may be so slight as to pass unnoticed, or so severe as to produce fatal intestinal obstruction. Pain is a very common and persistent sequel to abnormal adhesions in the abdominal cavity. It is usually referred to some one locality, or is manifested by certain positions or movements of the body.

A recent case illustrating this symptom was encountered in a lady who had suffered from recurrent attacks of appendicitis for many years. She remembered that since girlhood she has been unable to stand erect or lift her right arm above her head when standing, without a drawing pain in the right iliac region, also that extension of her right leg was followed by the same sensation. The appendix was found to be firmly adherent to the right broad ligament and its removal was followed by complete cessation of the former symptoms.

Indigestion and vomiting are frequently the result of adhesive bands which interfere with normal peristalsis.

A case of this kind was observed in Mrs. S., who, some years before I saw her, had, in lifting the marble top of a table, felt something give way in her right side. The accident was followed by severe pain. A few weeks after the accident she began suffering from what she thought was indigestion, with frequent attacks of vomiting. At the time I first saw her she was greatly emaciated and unable to walk any distance without intense pain. Upon opening the abdomen, adhesions were present binding and constricting the ascending colon. Release of the adhesions was followed by relief of all her former symptoms.

Constipation is probably the most common and persistent symptom of adhesions in the abdominal cavity. It is especially noticeable in women upon whom pelvic operations have been performed, by reason of adhesion about the rectum.

An interesting case of this kind was exhibited by Mrs. T., who had had nephrectomy of the left kidney performed through the abdominal route. She had suffered since the operation with most obstinate constipation. In attempting to pass the proctoscope over the promotory of the sacrum the instrument passed through the rectal wall. An immediate repair was made and the cause of the accident, as well as of the constipation, was found to be a firm peritoneal band binding the rectum upon the sacro-iliac junction. Fortunately the accident was followed by a favorable result and the constipation of years standing was relieved. I do not recommend such heroic measures as a common remedy for constipation, even though in this case the result was satisfactory.

Intestinal obstruction more or less complete is a not uncommon sequel of peritoneal adhesions. One author reports that thirty-one patients with intestinal obstruction, of whom five died, occurred in a series of 421 abdominal sections and 148 vaginal hysterectomies. Sir Spencer Wells admits having lost one and one-tenth per cent. of patients in his first thousand abdominal operations, from obstruction of the bowels. It must also be kept in mind that the evil effects of adhesions may not manifest themselves for years after the operation causing them. Shively, of New York, reports a case of fatal obstruction of the bowel occurring five or six years after an ovariotomy in which the intestine became adherent to the abdominal incision, persistent and severe attacks of colicky pain and obstinate constipation had persisted from the date of the operation. Burrell, of Boston, reports a case of total obstruction of the bowel five months after operation, the patient being well in the interval. Bidwell, of London, reports a case of obstruction occurring four and a half years after operation. Doubtless many fatal cases of intestinal obstruction occur which are not recognized, but are attributed to peritonitis and intractable vomiting. This latter symptom should always make us suspicious of obstruction of the bowel.

Peritoneal adhesions may stimulate other conditions, an interesting instance of which I wish to record.

Mrs H., aged 48, had suffered for some considerable time before coming under my care, with what she termed "stomach trouble". For a number of months she had been losing weight, vomiting frequently after eating, and suffering great distress when she did not vomit. Her skin was assuming the parchment yellow color so often seen in malignant diseases and her strength had so failed as to keep her in bed. Upon physical examination, a hard nodular mass was easily felt in the region of the pylorus. Examination of the stomach contents after a test meal showed complete absence of hydrochloric acid and the presence of the yeast fungus. From these symptoms it was easy to form a probable diagnosis of cancer of the pylorus. Operation was advised and submitted to. Instead of a carcinoma of the pylorus, peritoneal adhesions were

found which knuckled the first part of the duodenum, thereby causing a partial obstruction of the organ. Perfect restoration to health followed the release of the adhesions.

How to prevent these serious sequellæ had led to much experimentation, which has developed many helpful suggestions and some ingenious and unique methods of preventing them.

The abandonment of the *en masse* ligature, which a few years ago was the universal practice in operations about the female pelvis, has been attended with a great reduction in the number of serious peritoneal adhesions. No careful surgeon of the present day would leave a large pedicle without an effort to cover it over with peritoneum. The separate ligation of the vessels with the burial of all raw surfaces under adjacent peritoneum is an indispensable part of the toilet of abdominal operations not now neglected by conscientious workers.

It is scarcely necessary to insist upon the most rigid asepsis, since the role of bacteria in the production of adhesions is universally admitted, but even this does not prevent some bacteria from access to exposed surfaces. Turck has proven that hands of the operator, the linen about the field of operation after use, the skin of the patient, will produce cultures of bacteria after the most rigid disinfection possible. Therefore, it is highly essential to protect exposed serous surfaces by hot moist pads; to avoid handling the exposed organs as much as possible; to maintain the bodily heat by protecting the patient's trunk and limbs, and by keeping the temperature of the operating room sufficiently high. Turck recommends the use of hot water bags in the abdominal cavity instead of gauze pads or sponges, because they maintain the heat better and thus sustain the normal organic resistance and prevent shock. It is generally admitted that the use of antiseptics in the abdominal cavity, by their irritation of the endothelium of serous surfaces, renders these surfaces more susceptible to infection; consequently they should be abandoned. All blood clots should be removed, since they may become organized and cause adhesions. At least one case of fatal intestinal obstruction has been traced to this cause. Careful preliminary preparation of the bowels is of great importance in preventing auto-infection and in bringing the excretory organs to their highest efficiency. Careful replacement of the intestines in their natural position is of great value, since pseudo-ileus and total obstruction of the intestines are usually the result of adhesions of the bowels in abnormal positions. Filling the abdominal cavity with hot salt solution has been suggested as a valuable means of floating the intestines into their normal position. Every operator has observed that the most extensive adhesions may be present between intestinal coils which lie in their natural position, without causing interference with peristalsis. Such adhesions are very common in tubercular peritonitis.

(To be continued next month.)

WHAT IS CONSERVATISM IN MASTOIDITIS?*

By W. S. FOWLER, M. D., Bakersfield.

AS an intelligent understanding of the language used, and a practical agreement on the meaning of specific words or terms in our premise is necessary in sustaining any argument, I have endeavored to learn what is usually understood by "Conservatism" when the word is used in connection with surgical treatment of disease.

Inquiry among surgeons shows a decided difference of opinion on this point. Several among those whom our profession delights to honor as leaders, coincide in accepting the interpretation "That operative treatment which conserves most in health, function, comfort and well being with reasonable insurance against recurrence"; but quite a number, well known as authors and teachers, are better satisfied with the generally accepted political definition, "A disposition to maintain and adhere to an established custom"; and, as there seems to be no established custom in the treatment of mastoiditis, I must appeal to the society to accept the first definition given, as being more in accord with surgical principles and much more comprehensive than the latter.

The position of the self-named conservatives in the management of this disease, judging from recent reports of their work, seems to be one of masterful inactivity and expectant treatment carried to an extreme never before heard of since surgery became a science. In one series of cases reported, the surgeon seems to take pride in seeing how grave a case can be reported as recovering without operation, even describing patients in so deep a stupor from the effects of the disease that "they can scarcely be roused and could not talk intelligently when roused". Those of you who have cared for such cases, and they come to the lot of every general practitioner at some time in his career, will appreciate the gravity of the condition described, and while I do not deny that a patient of this kind may recover without operation, doubtless there is no one in hearing who would postpone active interference longer when such symptoms present themselves and there is no doubt of the diagnosis.

It is as a protest against the evil influence of such reports that this paper is written and it is a matter of much surprise to the writer that there can be any hesitation in the mind of any up-to-date man as to the proper course to pursue when the diagnosis has once been made. Why should this disease be singled out as an exception to those rules so well recognized as conservative in

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